Supplement to Electrical and Electronic Trader, 3 February 1967

"TRADER" SERVICE SHEET

1789

BAIRD M103

Battery Operated Portable Radio Receiver

EMPLOYING seven transistors and two crystal diodes, Baird M103 is a battery operated portable radio receiver.

An internal ferrite rod aerial provides reception on waveband ranges 1,145-2,000m (l.w.), 200-560m (m.w.) and 183-218m (bandspread m.w.), with waveband selection by press buttons. A socket is provided for the connection of a car aerial and another socket allows the output of the receiver to be fed to an external loudspeaker, earphone or tape recorder, the internal loudspeaker being automatically disconnected as the plug is inserted.

A variable treble cut tone control is fitted, also a speech/music switch which provides bass cut.

Transistor Table

Transistor		Emitter (V)	Base (V)	Collector (V)
TR1	AF117	0·7	0·9	7·0
TR2	AF117	0·9	1·0	5·6
TR3	AF117	1·0	1·1	7·0
TR4	AC127	4·4	4·0	0·15
TR5	OC81	—	0·15	4·4
TR6	OC81	4·5	4·7	9·0
TR7	AC127	4·5	4·4	—

TRANSISTOR ANALYSIS

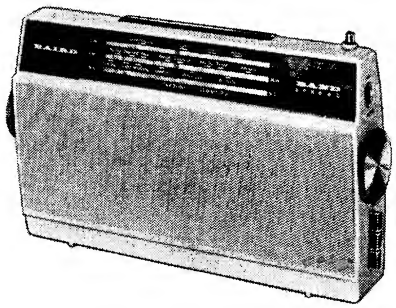
Transistor voltages given in the table in col. 1 were taken from data supplied by the manufacturers. All readings are negative with respect to chassis.

CIRCUIT DESCRIPTION

The aerial tuned circuit utilizes two sections of a four gang tuning capacitor. One section, **C4** with its trimmer **C3** tunes the medium wave (**L2**) and long wave (**L3**) windings on the ferrite rod aerial, while the other section **C2**, with its trimmer **C1** tunes the medium wave aerial coil (**L2**) when the receiver is switched to bandspread, an arrangement which overcomes the tracking difficulty encountered when using one tuning capacitor for both medium wave and bandspread reception.

Signals induced into **L2** and **L3** are inductively coupled to the base of **TR1** by **L5** and **L4** respectively. **C7** is an isolating capacitor to prevent the base potential of **TR1**, provided by **R1** and **R2**, from being short-circuited by the low resistance windings **L4/L5.**

TR1 is connected as a self-oscillating mixer, **L8** is the tuned oscillator winding, while **L6** and **L7** are coupling coils providing the positive feedback necessary for oscillation.



L8 is tuned on medium wave by **C16** and **C17** and on long wave by a combination of **C16, C17, C12** and **C13. C12** and **C13** being fixed and variable l.w. trimmers.

As in the aerial circuit, on bandspread a separate tuning gang section **C18** is used with its associated trimmer **C19.** Resistors **R4** and **R19** are incorporated to maintain constant oscillator voltage on all wavebands.

After additive mixing, the 470kc/s i.f. signal appearing at **TR1** collector is fed via **S8** to tappings on the primary of **T1** which

(Continued overleaf col. 1)

Resistors

R1	47kΩ	C2
R2	6·8kΩ	C2
R3	1kΩ	C2
R4	270kΩ	C2
R5	10kΩ	C2
R6	100Ω	B2
R7	2·7kΩ	C2
R8	150kΩ	C2
R9	1kΩ	B2
R10	680Ω	C2
R11	22kΩ	B2
R12	4·7kΩ	B2
R13	39kΩ	C2
R14	1kΩ	B2
R15	470Ω	B2
R16	10kΩ	B2
R17	50kΩ	A1
R18	50kΩ	A1
R19	470kΩ	B2
R20	22kΩ	B2
R21	33kΩ	B2
R22	4·7Ω	B2
R23	390Ω	A2
R24	560Ω	A2
R25	560Ω	A2
R26	1kΩ	A2
R27	82Ω	A2
R28	2·2Ω	A2
R29	2·2Ω	A2
R30	220Ω	B2

Capacitors

C1	—	B1
C2	—	B1
C3	—	C1
C4	—	C1
C5	4·7pF	C1
C6	50pF	A1
C7	0·01μF	C2
C8	0·1μF	C2
C9	0·022μF	C2
C10	180pF	C2
C11	140pF	C2
C12	120pF	C1
C13	80pF	C2
C14	25pF	C2
C15	370pF	C2
C16	—	C2
C17	—	C2
C18	—	C2
C19	—	C2
C21	4μF	B2
C22	2·5μF	C2
C23	0·1μF	C2
C24	270pF	B2
C25	270pF	B2
C26	0·02μF	B2
C27	0·1μF	B2
C28	270pF	B2
C29	0·5μF	B2
C30	0·01μF	B2
C31	0·01μF	B2
C32	160μF	A2
C33	6,800pF	B2
C34	0·47μF	B2
C35	0·22μF	B2
C36	0·47μF	B2
C40	200μF	B2
C41	160μF	B2
C42	2,000pF	A2
C43	200μF	A2

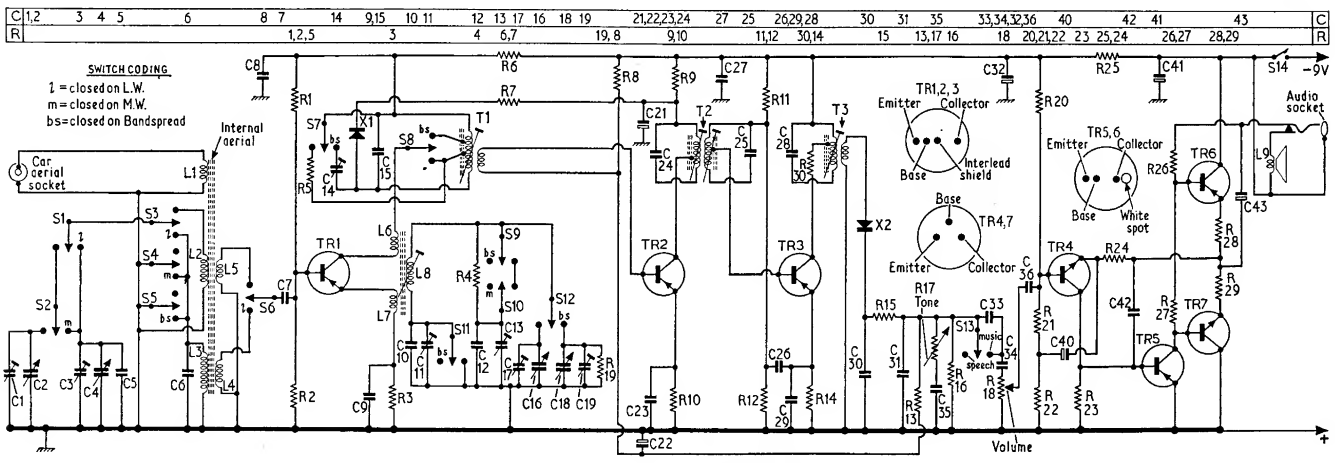
Coils

L1	—	A1
L2	—	B1
L3	—	A1
L4	—	A1
L5	—	B1
L6	—	C2
L7	—	C2
L8	—	C2
L9	15Ω	†
T1	—	C2
T2	—	B2
T3	—	B2

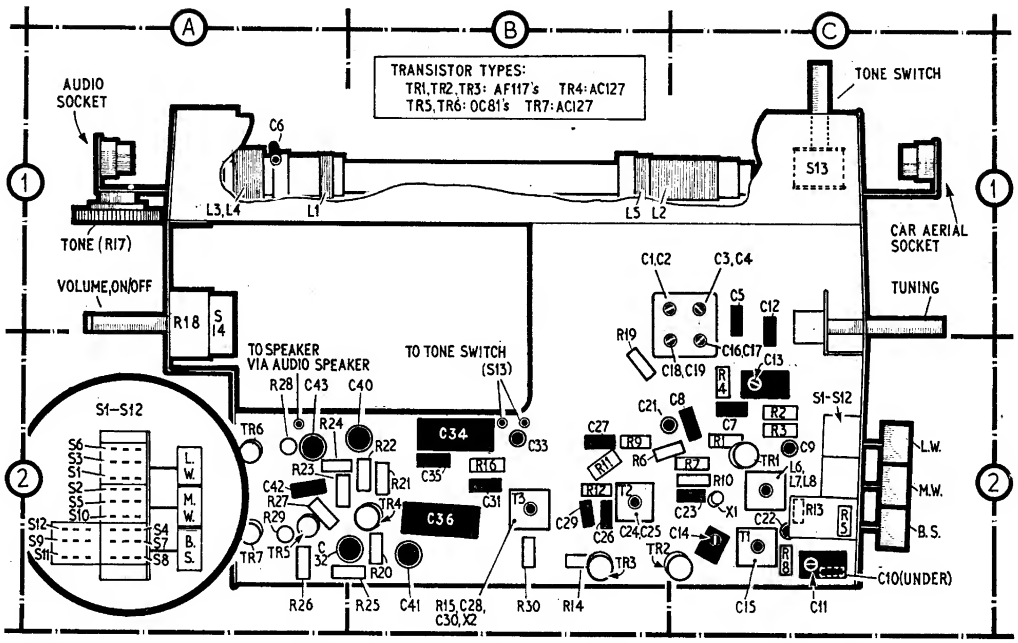
Miscellaneous

S1-S12	—	A2
S13	—	C1
S14	—	A1
X1	OA79	C2
X2	OA90	B2

† *Speaker*



Circuit diagram of Baird M103.



General view of component side of printed panel as seen from the front with the chassis removed from the case.

Circuit Description—*continued*

is shunted by **R5** to provide a flat i.f. response for m.w. and l.w. reception and is tapped to provide a restricted response for bandspread reception. **C14** is switched in on bandspread to correct the tuning of **T1** when the collector is switched to the upper tap.

Signals at i.f. are fed to the i.f. amplifiers **TR2** and **TR3**, and finally to the demodulator diode **X2**. After demodulation, the resultant audio signal is filtered by **C30, R15** and **C31** and passed to the volume control via the tone switch circuit **S13** and **C33.**

The d.c. component is filtered by **R13** and **C22** and fed to the base of **TR2** via the secondary of **T1** to provide a.g.c.

Diode **X1** is effectively connected across the primary of **T1** and is normally held "cut off" by the voltage drop across **R9.** When a strong signal is received, a large a.g.c. voltage is fed to the base of **TR2** reducing its collector current and thus causing the voltage across **R9** to fall. **X1** conducts and damps the primary of **T1** causing a further fall in overall gain.

From the volume control the audio signal is fed to **TR4** for amplification and appears across **TR4** collector load **R23.** This is d.c. coupled to the base of the driver transistor **TR5.**

Signals developed across **TR5** collector load **R26** are fed to the bases of the complementary output stage **TR6/TR7.**

R27 is included to maintain the correct base/emitter potential, and thus the correct quiescent current, for the output transistors.

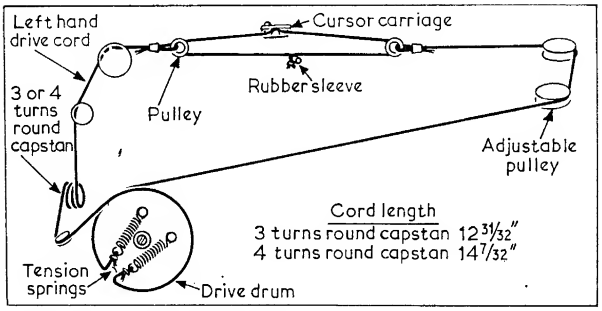
Audio output is developed across the 15Ω loudspeaker **L9.**

CIRCUIT ALIGNMENT

Equipment Required.—An a.m. signal generator with 30 per cent modulation; an audio output meter with an impedance to match 15Ω; an r.f. coupling loop and suitable non-ferrous trimming tools. During alignment the signal level should be adjusted to maintain an output of 50mW with the volume control at maximum.

1.—Connect the output meter in place of the loudspeaker. Turn the tuning gang to maximum, and with the tone control turned to maximum treble, the speech/music switch depressed and the receiver switched to m.w., feed in a 470kc/s signal via the car aerial socket.
2.—Adjust the core of **T3** for maximum output (tune to peak nearest the top of former).
3.—Adjust the bottom core of **T2** for maximum output (tune to *outer* peak).
4.—Adjust the top core of **T2** for maximum output (tune to *outer* peak).
5.—Adjust the core of **T1** for maximum output.
6.—Repeat as necessary, in the same order, until no further improvement can be obtained.
7.—Depress "Bandspread" button and adjust **C14** for maximum output, keeping the signal input level as low as possible.
8.—With receiver still switched to m.w., set all four trimming capacitors located on the rear of the tuning gang assembly to their mid-position. With the tuning gang at maximum, adjust the cursor to line up with the calibration mark at the low frequency end of the scale.
9.—Tune receiver to 500m and feed in a 600kc/s signal via the r.f. coupling loop. Adjust **L8** to tune in this signal. Adjust **L2** for maximum output, by sliding the former along the ferrite rod.
10.—Tune receiver to 200m and feed in a 1.5Mc/s signal via the r.f. loop. Adjust **C17** to tune in this signal. Adjust **C3** for maximum output.
11.—Repeat operations 9 and 10 until the calibration is correct and maximum output is obtained.
12.—Switch receiver to l.w. and tune to 1,800m. Feed in a 166.6kc/s signal and adjust **C13** to tune in this signal. Adjust **L3** for maximum output by sliding the former along the ferrite rod.
13.—Switch to "Bandspread" and tune to 185m. Feed in a 1,620kc/s signal and adjust **C19** to tune in this signal. Adjust **C1** for maximum output. Tune receiver to 210m and feed in a 1,437kc/s signal. Adjust **C11** to tune in this signal. Retune receiver to 185m and readjust **C11.** Repeat procedure until calibration is correct at 185 and 210m. Seal **C11** with wax.

Note: Due to the tolerance in the capacitance of the tuning gang, **C11** may have to be fully unscrewed. It is necessary therefore, to follow the alignment procedure carefully in order to obtain best results.



Drive cord assembly as seen from rear of the receiver.

GENERAL NOTES

Dismantling.—To remove the chassis from the case, first remove the back cover, the battery and the two large push-on knobs. Loosen the two screws which hold the bracket carrying the tone control and remove the three chassis fixing screws. (Two of these are under the tuning knob on the outside of the case and the other under the volume control spindle inside the cabinet.) Slide the tone control bracket back and lift the volume control end of the chassis out of the case, at the same time sliding the press buttons out of their slot in the case. The chassis can then be removed to the extent of the loudspeaker leads. Should the chassis have to be removed completely, the loudspeaker leads should be unsoldered.

Battery.—Ever Ready PP7 or equivalent.

Printed in Great Britain by George Rose Printers, Nursery Road/Zion Road, Thornton Heath, Surrey, and Published by Iliffe Electrical Publications, Ltd., Dorset House, Stamford Street, London, S.E.1.